<u>IN THE SPECIFICATION</u>:

Please amend paragraph number **[0004]** as follows:

[0004] As known within the art, blades provided on a rotary drill bit may be selected to be provided with replaceable cutting elements installed ~~theron,~~ <u>thereon,</u> allowing the cutting elements to engage the formation being drilled and to assist in providing cutting action therealong. Replaceable cutters may also be placed adjacent to the gage area of the rotary drill bit and sometimes on the gage thereof. One type of cutting element, referred to as inserts, compacts, and cutters, has been known and used for providing the primary cutting action of rotary drill bits and drilling tools. These cutting elements are typically manufactured by forming a superabrasive layer, or table, upon a sintered tungsten carbide substrate. As an example, a tungsten carbide substrate having a polycrystalline diamond table or cutting face is sintered onto the substrate under high pressure and temperature, typically about 1450° to about 1600° C. and about 50 to about 70 kilobar pressure to form a PDC cutting element or PDC cutter. During this process, a metal sintering aid or catalyst such as cobalt may be premixed with the powdered diamond or swept from the substrate into the diamond to form a bonding matrix at the interface between the diamond and substrate.

Please amend paragraph number **[0034]** as follows:

[0034] Regardless of the actuation means for displacing the movable blades or bearing pads within the expandable reamer, the reamer may be configured so that the blades or bearing pads may be locked into a position. The locked position may be fully expanded or <u>expanded to</u> an intermediate position. Locking elements may slide in response to increasing drilling fluid pressure, or may comprise a tapered fit between a sliding element and the movable blades, or a locking mechanism such as linkages that engage the movable blades. Other locking mechanisms may be used as are known in the art.

Please amend paragraph number **[0048]** as follows:

[0048] FIG. 1I is a side cross-sectional view of the lower longitudinal region~~-the-~~ of the expandable reamer shown in FIG. 1H;

Please amend paragraph number **[0069]** as follows:

[0069] Referring to FIGS. 1A and 1B of the drawings, each shows a conceptual schematic side view of an expandable reamer 10 of the present invention. Expandable reamer 10 includes a tubular body 32 with a bore 31 extending therethrough, having movable blades 12 and 14 outwardly spaced from the centerline or longitudinal axis 25 of the tubular body 32. Tubular body 32 includes a~~-male threaded-~~ male-threaded pin connection 11 as well as a~~-female threaded~~ female-threaded box connection 15, as known in the art. Movable blades 12 and 14 may each carry a plurality of cutting elements 36. Cutting elements 36 are shown only on movable blade 12, as the cutting elements on movable blade 14 would be facing in the direction of rotation of the expandable reamer 10 and, therefore, may not be visible in the view depicted in FIG. 1A. Cutting elements 36 may comprise PDC cutting elements, thermally stable PDC cutting elements (also known as~~-"TSP's"),-~~ "TSPs"), superabrasive impregnated cutting elements, tungsten carbide cutting elements, and any other known cutting element of a material and design suitable for the subterranean formation through which a borehole is to be reamed using expandable reamer 10. One particularly suitable superabrasive impregnated cutting element is disclosed in U.S. Patent 6,510,906, the disclosure of which is incorporated herein by reference. It is also contemplated that, if PDC cutting elements are employed, they may be positioned on a blade so as to be circumferentially and rotationally offset from a radially outer, rotationally leading edge portion of a blade where a casing contact point is to occur. Such positioning of the cutters rotationally, or circumferentially, to the rotational rear of the casing contact point located on the radially outermost leading edge of the blade allows the cutters to remain on proper drill diameter for enlarging the borehole, but are, in effect, recessed away from the casing contact

point. Such an arrangement is disclosed and claimed in U.S. Patent Application Serial No. 10/120,208 filed April 10, 2002, the disclosure of which is incorporated herein by reference.

Please amend paragraph number **[0073]** as follows:

[0073] Thus, FIG. 1B shows an operational state of expandable reamer 10 wherein actuation sleeve 40 is positioned longitudinally so that apertures or ports 42 allow drilling fluid flowing through expandable reamer 10 to pressurize the annulus 17 formed between the outer surface of actuation sleeve 40 and inner radial surface of movable blades 12 and 14 to force movable blade 12 against blade-biasing elements 24 and ~~26~~ 26, as well as forcing movable blade 14 against blade-biasing elements 28 and 30. Further, the pressure applied to the inner surfaces 21 and 23 may be sufficient so that movable blade 12 compresses blade-biasing elements 24 and 26 and may matingly engage the inner radial surface of retention element 16 as shown in FIG. 1B. Regions 33 and 35 indicate a portion of the tubular body 32 that may contain holes for disposing removable lock rods (not shown) as described in FIG. 1D for affixing retention element 16 and movable blade 12 thereto. Likewise, the pressure applied to the inner surfaces 21 and 23 may be sufficient so that movable blade 14 compresses blade-biasing elements 28 and 30 and may matingly engage the radial inner surface of retention element 20 as shown in FIG. 1B. Thus, the movable blades 12 and 14 of expandable reamer 10 of the present invention may be caused to expand to an outermost radial or lateral position and the borehole may be enlarged by the combination of rotation and longitudinal displacement of the expandable reamer 10.

Please amend paragraph number **[0077]** as follows:

[0077] FIGS. 1D1 and 1D2 show an embodiment of a movable blade-retention apparatus 201 consistent with the embodiments of expandable reamer 10, as shown in FIGS. 1A-1B, wherein removable lock rods 203 extend longitudinally along the tubular body 32 of the expandable reamer 10 at different circumferential placements, respectively. Retention

block 206 may be formed as an integral part of the tubular body 32, or may be welded onto the tubular body 32. As shown in FIG. 1D1, removable lock rods 203 are partially extending into holes 205 within retention block 206 formed within regions 33 and 35 (also depicted in FIGS. 1A and 1B), the inner portions of holes 205 being in alignment with grooves 205a on the interior of retention block 206 (see FIG. 1D2), and further matingly engaging grooves 205b (see FIG. 1D2) extending longitudinally along the exterior of retention element 16 to retain movable blade 12. More specifically, holes 205 formed in the tubular body 32 in the ~~areas~~ regions 33 and 35, as shown in FIGS. 1A-1C, allow for removable lock rods 203 to be inserted therethrough, extending between retention element 16 and retention body 205, thus affixing retention element 16 to tubular body 32. When fully installed, removable lock rods 203 extend substantially the length of retention block 206, but may extend further, depending on how the removable lock rods 203 are affixed to the retention block 206. Removable lock rods 203 may be threaded, splined, pinned, welded or otherwise affixed to the retention block 206. Of course, in one embodiment, removable lock rods 203 may be detached from the retention block 206 to allow for removal of retention element 16 as well as movable blade 12. Accordingly, the present invention contemplates that a retention element and/or a movable blade of the expandable reamer may be removed, replaced, or repaired by way of removing the removable lock rods 203 from the holes 205 within the body of the expandable reamer 10. Of course, many alternative removable retention configurations are possible including pinned elements, threaded elements, dovetail elements, or other connection elements known in the art to retain movable blade 12. Movable blade 14 and/or any other movable blades may be retained in a similar manner. Also depicted in FIG. 1D2 is circumferential seal assembly 207 carried in groove 209 on the exterior of blade 12 to prevent debris and contaminants from the wellbore from entering the interior of expandable reamer 10.

Please amend paragraph number **[0078]** as follows:

[0078] As may also be seen in ~~FIG. 1D,~~ FIGS. 1D1 and 1D2, the cross-sectional shape of the movable blade 12 as it extends through the retention element 16 may be oval or elliptical.

Such a shape may prevent binding of the movable blade 12 as it is moved laterally inwardly and outwardly during use. Thus, the shape of the longitudinal sides of the movable blades may not be straight. For instance, each longitudinal side of a movable blade may comprise an oval, elliptical, or other arcuate shape. Further, the sides need not be symmetrical, but may be if symmetry is desirable.

Please amend paragraph number **[0085]** as follows:

[0085] As a further embodiment of the present invention, expandable reamer 410 is shown in FIGS. 1F and 1G, wherein the actuation sleeve 440 may be configured to pass substantially longitudinally past the lower longitudinal extent of the movable blades 412 and 414 upon actuation thereof. FIGS. 1F-1G illustrate an embodiment of an expandable reamer 410 of the present invention, wherein actuation sleeve 440 may be used to actuate the movable blades 412 and 414. Expandable reamer 410 includes a tubular body 432 with a bore 431 extending therethrough and movable blades 412 and 414 outwardly spaced from the centerline or longitudinal axis 425 of the tubular body 432, wherein each movable blade 412 and 414 may carry a plurality of cutting elements 436, as known in the art. Tubular body 432 also includes a ~~male threaded~~ male-threaded pin connection 411 as well as a ~~female threaded~~ female-threaded box connection 415. Cutting elements 436 are shown only on movable blade 412 for clarity, as the cutters on movable blade 414 may be typically facing in the direction of rotation of the tubular body 432 and, therefore, may not be visible in the view depicted in FIGS. 1F and 1G.

Please amend paragraph number **[0086]** as follows:

[0086] As depicted in FIG. 1F, the expandable reamer 410 is shown in a contracted state, wherein the movable blades 412 and 414 are positioned radially or laterally inwardly. Actuation sleeve 440 may be positioned longitudinally in a first position near the upper longitudinal end of the tubular body 432, so that the exterior of the upper end 451 of the actuation sleeve 440 is positioned to seal against the actuation seal 443. Further, actuation

seal 443 and lower sleeve seal 445 may seal against the actuation sleeve 440. Thus, drilling fluid (not shown) may pass through actuation sleeve 440 without communicating with the inner surfaces 421 and 423 of movable blades 412 and 414, respectively, so long as the actuation sleeve 440 is appropriately longitudinally positioned by way of shear pins, interlocking members, frictional elements, collets, friable members, or otherwise as known in the art.

Please amend paragraph number **[0089]** as follows:

[0089] FIG. 1H shows the upper longitudinal region of another embodiment of an expandable reamer ~~710~~ 710, wherein the actuation sleeve 740 may be configured to longitudinally pass through the longitudinal region occupied by the movable blades 712 and 714. Expandable reamer 710 includes a tubular body 732 with bore 731 extending therethrough and movable blades 712 and 714 outwardly spaced from the centerline or longitudinal axis 725 of the tubular body 732. Each movable blade 712 and 714 may carry a plurality of cutting elements (not shown for clarity). Further, movable blades 712 and 714 may carry at least one ovoid structure 737. Ovoid structures 737 are shown in ~~FIGS. 1H and 1I~~ FIG. 1H within gage areas 739 of the movable blades 712 and 714 for protecting associated cutting elements (not shown) proximate thereto. Tubular body 732 also includes a ~~female threaded~~ female-threaded box connection 715 at its upper longitudinal end and a ~~male threaded~~ male-threaded pin connection 711 at its lower longitudinal end.

Please amend paragraph number **[0093]** as follows:

[0093] As may further be seen with respect to FIG. 1I, retaining sleeve 748 is sized and configured so that the actuation sleeve 740 may be disposed longitudinally therein. Therefore, upon sufficient force, the actuation sleeve 740 may be longitudinally displaced so that its lower longitudinal end matingly engages the longitudinally lower end of the retaining sleeve 748. In such a position, the actuation sleeve 740 may not coincide with any portion of the longitudinal extent of movable blades 712 and 714. As mentioned hereinabove, such a configuration may

facilitate movable blades 712 and 714, once expanded, to return radially or laterally inwardly. Retaining sleeve 748 may be prevented from longitudinal movement by way of indentation 756 and complementary male feature 759 disposed therein. Further, as shown in FIG. 1I, retaining sleeve 748 may include longitudinal slots 758 configured to increase the flow area available for drilling fluid passing through the expandable reamer 710. More specifically, the actuation sleeve 740 may be disposed within the retaining sleeve ~~748 such~~ 748, such that drilling fluid may pass through both the reduced cross-sectional orifice 750 and the longitudinal slots 758. One way to do so would be to configure the lengths of the actuation sleeve 740 and the retaining sleeve 748 so that the longitudinal upper surface of the actuation sleeve 740 is positioned below the upper extent 761 of the longitudinal slots 758. Such a configuration may improve the drilling fluid flow characteristics of the expandable reamer 710.

Please amend paragraph number **[0094]** as follows:

[0094] FIGS. 2A-2B illustrate another exemplary embodiment of an expandable reamer 210 of the present invention, wherein a restriction element 266 may be used to actuate the movable blades 212 and 214. Expandable reamer 210 includes a tubular body 232 with a bore 231 extending therethrough and movable blades 212 and 214 outwardly spaced from the centerline or longitudinal axis 225 of the tubular body 232, wherein each movable blade 212 and 214 may carry a plurality of cutting elements 236. Tubular body 232 may also include a ~~male threaded~~ male-threaded pin connection 211 as well as a ~~female threaded~~ female-threaded box connection 215. Cutting elements 236 are shown only on movable blade 212 for clarity, as the cutting elements on movable blade 214 may typically be facing in the direction of rotation of the expandable reamer 210 and, therefore, may not be visible in the view depicted in FIGS. 2A and 2B.

Please amend paragraph number **[0096]** as follows:

[0096] However, a restriction element 266 may be deployed within the drilling fluid stream and may ultimately be disposed within sleeve seat 252, as shown in FIG. 2B. Initially, as restriction element 266 becomes disposed within sleeve seat 252, the actuation sleeve 240 longitudinal position may be as shown in FIG. 2A. However, drilling fluid pressure may cause the actuation sleeve 240 to be displaced longitudinally to a position shown in FIG. 2B. Upon contact between actuation seal 243 and the actuation sleeve 240 ceasing, drilling fluid may pass into the annulus 217 formed between the inner surfaces 221 and 223 of movable blades 212 and 214, respectively, and the actuation sleeve 240. Although blade-biasing elements 224, 226, 228, and 230 may be configured to provide an inward radial or lateral force upon movable blades 212 and 214, drilling fluid pressure acting upon the inner surfaces 221 and 223 may generate a force that exceeds the inward radial or lateral force and movable blades 212 and 214 may be disposed radially or laterally outward, thus matingly engaging retention elements 216 and 220, respectively. Retention elements 216 and 220 may be affixed to tubular body 232 by way of removable lock rods (not shown) disposed therethrough and within regions 233 and 235 as described hereinabove in relation to FIGS. 1A, 1B, and 1D. Thus, the movable blades 212 and 214 of expandable reamer 210 may be caused to expand to an outermost position and the borehole may be enlarged by the combination of rotation and longitudinal displacement of the expandable reamer 210.

Please amend paragraph number **[00106]** as follows:

[00106] However, since it may be preferred to drill with multiple reaming/drilling blades, multiple expandable reamer subs 310 may be assembled together or to other drilling equipment via ~~female threaded~~ female-threaded box connection 315 and ~~male threaded~~ male-threaded pin connection 311. Accordingly, each movable blade 312 of each expandable reamer sub 310 may be aligned circumferentially as desired in relation to one another. For instance, three expandable reamer subs 310 may be assembled so that each movable blade 312 is

circumferentially separated from another movable blade 312 by about 120°. Of course, many different assemblies containing different numbers of movable blades in different arrangements are contemplated by the present invention.

Please amend paragraph number **[00109]** as follows:

[00109] Furthermore, different movable blades may be configured to drill at different diameters. FIG. 5C schematically shows a ~~schematic~~ cross-sectional bottom view of an expandable reamer 181 of the present invention where movable blades 182, 186, and 190 are configured in a circumferentially symmetric arrangement about bore 187 and are shown at their outermost radial or lateral positions, substantially conforming to reference diameter 194. In addition, movable blades 184, 188, and 192 are configured in a circumferentially symmetric arrangement about bore 187 and are shown at their outermost radial or lateral positions, thus substantially conforming to reference diameter 196. Prior to expansion, movable blades 182, 184, 186, 188, 190, and 192 may be positioned at substantially the outer diameter of the tubular body 183. Further, movable blades 182, 186, and 190 may be configured to actuate or be displaced radially or laterally outwardly under operating conditions different from movable blades 184, 188, and 192. Conversely, movable blades 182, 186, and 190 may be configured to actuate or be displaced outwardly under substantially the same operating conditions as movable blades 184, 188, and 192. Accordingly, as may be seen from FIG. 5C, the expandable reamer of the present invention contemplates different sets of movable blades corresponding to different effective drilling diameters.

Please amend paragraph number **[00110]** as follows:

[00110] In any of the above embodiments of expandable reamers of the present invention, adjustable spacer elements may be employed so that an expandable reamer may be adjustable in its reaming diameter. Such a configuration may be advantageous to reduce inventory and machining costs, and for flexibility in use of the expandable reamer. FIGS. 6A and

6B show adjustable spacer elements 288 and 290 that may be replaced and/or adjusted. More specifically, for example, length "L" as shown in FIG. 6B may be modified so that the outermost radial or lateral position of movable blade 282 may be adjusted accordingly. Adjustable spacer elements 288 and 290 may be disposed within blade-biasing elements 292 and 294 as shown in FIG. 6A, or may be affixed to movable blade 282 or retention element 284. Thus, utilizing adjustable spacer elements 288 and 290 may allow for a single movable blade design and spacing element design to be used in various borehole sizes and applications. For instance, the expandable reamer of the present ~~invention~~ invention, including adjustable spacer elements 288 and ~~290~~ 290, may enlarge a particular section of borehole to a first diameter, then may be removed from the borehole and another set of adjustable spacer elements having a different length "L" may replace adjustable spacer elements 288 and 290, then the expandable reamer may be used to enlarge another section of borehole at a second diameter. Further, minor adjustment of the outermost lateral position of the movable blade may be desirable during drilling operations by way of threads or other adjustment mechanisms when adjustable spacer elements 288 and 290 are affixed to either the movable blade 282 or retention element 284.

Please amend paragraph number **[00111]** as follows:

[00111] Also applicable generally to the embodiments of the present invention including movable blades is a particular seal arrangement, as shown in FIGS. 7A and 7B. A T-shaped seal 380 comprising a relatively soft material, such as VITON™, may be disposed adjacent to one or more relatively stiff backup seals 384 or 382 having a wiping surface 387 or 389 including at least two ridges 390 or 392, respectively. More specifically, the ~~width, W,~~ width "W" of the T-shaped seal 380 may be about .585 inch, while the ~~height, H,~~ height "H" of the backup seals 382 and 384 may be about .245 inch. Because ~~back up~~ backup seals 384 and 382 are relatively stiff, ~~the~~ they must each have one cut or slice therethrough to allow the ~~back up~~ backup seal 384 or 382 to collapse to a reduced diameter for insertion and subsequently enable the seal to open to its larger, normal diameter and fit into the groove with ~~T-shaped~~ T-shaped seal 380. When a ~~back up~~ backup seal 382 or 384 is in place, it returns to its normal diameter

adjacent T-shaped seal 380. Such a configuration may be advantageous for inhibiting interaction between the T-shaped seal 380 and contaminants. More specifically, as shown in FIG. 7B, upon compression of and subsequent applied differential pressure to T-shaped seal 380 by way of adjacent surface 399, the backup seals 384 and 382 may contact the adjacent surface 399. Thus, as either the T-shaped seal 380 or surface 399 moves relative to one another, one of the backup seals 384 or 382 contacts the surface 399 prior to the T-shaped seal 380, according to the direction of travel. Ridges 390 and 392 may therefore facilitate removal of contaminants from the surface 399 and thereby inhibit contaminants from contacting T-shaped seal 380. Ridges 390 and 392 are one possible configuration for backup seals 384 or 382; however, any nonplanar surface geometry may be used as well. Of course, relative motion between the T-shaped seal 380 and another surface may be anticipated in one direction only. Therefore, one backup seal configured with ridges and located adjacent the T-shaped seal 380 preceding the anticipated direction of movement may be sufficient to protect the T-shaped seal 380.

Please amend paragraph number **[00113]** as follows:

[00113] As shown in FIGS. 8A and 8B, shaped cavity 472 may be formed wherein the end 479 thereof may allow communication with drilling fluid. The flexible diaphragm 474 and protector cup 473 may be disposed therein, as shown in FIG. 8A. The chamber formed between the flexible diaphragm 474 and the protector cup 473 may be filled with lubricant 477. The compensator cap 482, snap ring 488, lubricant plug 484, and sealing element 486 may allow for assembly of the compensator ~~470~~ 470, as well as replacement of the lubricant 477, protector cup 473, or flexible diaphragm 474.

Please amend paragraph number **[00115]** as follows:

[00115] As shown in FIG. 8B, compensators 470, 471 may be disposed within the movable blades 590 and 592, affixed to tubular body 571 by way of retention elements 572 and 570, respectively. Movable blade 590 includes seal elements 582 and 584 disposed in

grooves 583 and 585 extending about an exterior thereof, while movable blade 592 includes seal elements 586 and 588 disposed in grooves 587 and 589 extending about an exterior thereof. Compensator 470 acts upon the lubricant in communication with a circumferential area on the exterior of movable blade 590 located between seal elements 582 and 584 while compensator 471 acts upon the lubricant in communication with a circumferential area on the exterior of movable blade 592 located between seal elements 586 and 588. More specifically, compensator 470 may supply lubricant to seal elements ~~582and~~ 582 and 584 via lubricant delivery tubes 480. Similarly, compensator 471 may supply lubricant to seal elements 586 and 588 via lubricant delivery tubes 480. Accordingly, as movable blades 590 and 592 move radially or laterally inwardly and outwardly, compensators 470, 471 move therewith, respectively. It may be advantageous to configure seal elements 582, 584, 586 and 588 so that radially inward seal elements 584 and 588 may preferentially prevent lubricant from passing thereby in relation to radially outward seal elements 582 and 586, respectively. For instance, radially inward seal elements 584 and 588 may be held in greater compression than radially outward seal elements 582 and 586. Such a configuration may prevent lubricant from contacting blade-biasing elements 574, 576, 578, and 580, and may further prevent debris from entering across radially outward seal elements 582 and 586. Of course, a compensator may be disposed, sized, and oriented within the tubular body of an expandable reamer of the present invention as physical size allows. For instance, it may be preferred to orient the end 479 of the shaped cavity 472 to communicate with the exterior of the movable blades 590 and 592. Furthermore, a compensator may be employed with respect to lubricant in communication with roller or thrust bearings, bushings, static seals, actuation sleeve seals, or any other moving elements within the expandable reamer of the present invention, without limitation.

Please amend paragraph number **[00116]** as follows:

[00116] In another exemplary embodiment of the present invention, a separation element actuation system may actuate as well as maintain the cleanliness and functionality of the movable blades 512 and 514 of expandable reamer 510 of the present invention. FIGS. 9A and 9B

illustrate an expandable reamer 510 of the present invention including movable blades 512 and 514 outwardly spaced from the centerline or longitudinal axis 525 of the tubular body 532, affixed therein by way of retention elements 516 and 520, respectively, and carrying cutting elements 536 (only shown on movable blade 512 for clarity). Tubular body 532 includes a bore 531 therethrough for conducting drilling fluid as well as a ~~male threaded~~ male-threaded pin connection 511 and a ~~female threaded~~ female-threaded box connection 515. As shown in FIGS. 9A-9B, a separation element ~~560~~ 560, including a reduced cross-sectional orifice ~~550~~ 550, may also comprise sealing element 543. Thus, drilling fluid may act upon the upper surface 533 of one side of the separation element 560, while another fluid, such as oil, acts upon the lower surface 535 of the separation element 560. Such a configuration may substantially inhibit drilling fluid from contacting the inner surfaces 521 and 523 of movable blades 512 and 514. Accordingly, as may be seen in FIGS. 9A and 9B, an upper chamber 513 and the annulus 517 formed between the separation element 560 and the inner surfaces 521 and 523 of the movable blades 512 and 514 may be sealed from drilling fluid passing through expandable reamer 510 by sealing element ~~543~~ 543, as well as lower sealing element 545. Upper chamber 513 and annulus 517 may be filled with a fluid by way of port 549, which may be sealed otherwise by way of a threaded plug or as otherwise configured during use of the expandable reamer 510.

Please amend paragraph number **[00121]** as follows:

[00121] Movable bearing pads may also be included within the expandable reamer of the present invention. FIG. 11A shows an expandable reamer 101 of the present invention including movable bearing pads 152 and 154, wherein both the movable blades 112 and ~~114 as~~ 114, as well as movable bearing pads 152 and ~~154 are~~ 154, are disposed at their outermost lateral positions. Further, expandable reamer 101 includes tubular body 132, bore 131, and movable blades 112 and 114 carrying cutting elements 136 (shown only on movable blade 112, for clarity). Retention elements 116 and 120 may retain movable blades 112 and 114 within tubular body 132 by way of removable lock rods (not shown) or as otherwise configured. Similarly,

bearing pad retention elements 160 and 162 may retain movable bearing pads 152 and 154 within tubular body 132. Tubular body 132 may include ~~a male threaded~~ male-threaded pin connection 111, ~~female threaded~~ female-threaded box connection 115, and bore 131 extending therethrough.

Please amend paragraph number **[00123]** as follows:

[00123] Therefore, operation of expandable reamer 101 is generally similar to the operation described hereinabove with respect to FIGS. 1A and 1B, in that movable blades 112 and 114 may be forced against blade-biasing elements 124, 126, 128, and 130 configured to provide an inward radial or lateral force thereon, respectively, opposing forces developed by drilling fluid acting upon the inner surfaces 121 and 123 of movable blades 112 and 114. In addition, movable bearing pads 152 and 154 may expand or contract radially or laterally according to the drilling fluid pressure and the forces applied thereto by way of associated bearing pad biasing elements 164, 166, 168 and 170. More particularly, movable bearing pad 154 compresses biasing elements 164 and ~~166 while~~ 166, while movable bearing pad 152 compresses biasing elements 168 and 170, according to the drilling fluid pressure acting upon inner surfaces 153 and 151. Upon sufficient drilling fluid pressure acting upon inner surfaces 151 and 153, movable bearing pad 154 matingly engages retention element 160 at its outermost radial or lateral position, while movable bearing pad 152 matingly engages retention element 162 at its outermost radial or lateral position, as shown in FIG. 11A. Movable bearing pads 152 and 154 may be configured, via bearing pad biasing elements 164, 166, 168 and 170 to expand under different conditions than the movable blades 112 and 114. For instance, movable bearing pads 152 and 154 may be configured to expand at less pressure than movable blades 112 and 114 to provide increased stability to the expandable reamer 101 prior to the movable blades' 112 and 114 movement to their outermost lateral positions. Of course, expandable reamer 110 may comprise one or more movable bearing pads configured in circumferentially asymmetric or symmetric arrangements.

Please amend paragraph number **[00124]** as follows:

[00124] In a further exemplary embodiment of the expandable reamer of the present invention, the vector sum of the cutting forces may be directed toward a fixed bearing pad or movable bearing pad. FIGS. 11B and 11C show an expandable reamer assembly 301 of the present invention in a side perspective view and a schematic top cross-sectional view, respectively. Expandable reamer 300 includes movable blades 303, 305, and 307 disposed therein via removable lock rods (not shown) disposed within holes 306. In addition, movable bearing pad 302 (not shown in FIG. 11B, as it is positioned on the opposite side of the view in FIG. 11B) is disposed within expandable reamer 300. Pilot drill bit 256 may be affixed to expandable reamer 300 via a threaded connection, as known in the art. Pilot drill bit 256, as shown, is a rotary drag bit including blades ~~259,~~ 258, 260, 262, and bearing pad 264 (not shown in FIG. 11B as it is positioned on the opposite side of the view in FIG. 11B). Pilot drill bit 256 may employ PDC cutting elements 254 although, as previously noted, a tricone pilot bit or other rotary bit may be employed without limitation. Similarly, movable blades 303, 305, and 307 may carry PDC cutting elements 340. The top end of expandable reamer 300 comprises a ~~male threaded~~ male-threaded pin connection 251 for threading to a drill string bottom hole assembly or to the output shaft of a downhole motor bearing housing (not shown), the motor typically being a positive-displacement or Moineau-type drilling fluid-driven motor as known in the art. The direction of rotation ~~260~~ 261 of the expandable reamer assembly 301 is also shown for clarity.

Please amend paragraph number **[00125]** as follows:

[00125] FIG. 11C shows a schematic top cross-sectional view of an expandable reamer assembly 301 of the present invention wherein the sum of cutting forces of the expandable reamer 300 is directed toward a movable bearing pad 302 along direction vector 175 while the sum of the cutting forces of the pilot drill bit 256 (FIG. 11B) is directed toward a drill bit bearing pad 264 along direction vector 175, the drill bit bearing pad 264 and the movable bearing

pad 302 being circumferentially aligned. Drill bit blades 259, 260, 262 and bearing pad 264 are arranged circumferentially asymmetrically and configured, sized, and positioned to drill a borehole of reference diameter 171. Similarly, movable blades 303, 305, 307, and movable bearing pad 302 are arranged circumferentially asymmetrically and configured, sized, and positioned to ream a borehole of reference diameter 161 corresponding to their outermost lateral positions, respectively.

Please amend paragraph number **[00127]** as follows:

[00127] As mentioned hereinabove, perceptible drilling fluid pressure responses may indicate an operational state of an expandable reamer of the present invention, and it may be advantageous to configure an expandable reamer of the present invention to exhibit such drilling fluid pressure responses. FIG. 12 shows a conceptual depiction of a perceptible pressure response occurring during the increase in drilling fluid flow between starting time t0 and ending time tf for an expandable reamer according to the present invention wherein a sliding mechanism, such as the aforementioned actuation sleeve 40, moves to allow drilling fluid pressure to force movable blades 12 and 14 radially or laterally outward. Considering the actuation sleeve configuration shown in ~~FIG.1A,~~ FIG. 1A, at time t1 (labeled "Trigger Point"), drilling fluid may begin to communicate with annulus 17 by way of apertures 42 in actuation sleeve 40 and may also exit from port 34, and, accordingly, the drilling fluid pressure may drop. Alternatively, an actuation sleeve or actuation mechanism may suddenly pressurize annulus 17 by way of a shear pin or other friable member that suddenly allows the actuation sleeve to move, thus causing the drilling fluid pressure to drop. Subsequent to the initial communication of drilling fluid pressure to annulus 17 and movable blades 12 and 14, drilling fluid pressure may build within the annulus 17 as the blade-biasing elements 24, 26, 28, and 30 resist the movement of movable blades 12 and 14. Further, drilling fluid pressure may equalize and then may continue to rise to a desired level as an equilibrium flow rate is established through the expandable reamer 10.

Please amend paragraph number **[00130]** as follows:

[00130] Further, it may be advantageous to tailor the fluid path through the expandable reamer in relation to an operational state thereof. FIGS. 14A and 14B show an expandable reamer 610 of the present invention including tubular body 632, bore 631, and movable blades 612 and 614 carrying cutting elements 636 (shown only on movable blade 612 for clarity) outwardly spaced from the centerline or longitudinal axis 625 of the tubular body 632. Retention elements 616 and 620 may retain movable blades 612 and 614 within tubular body 632 by way of removable lock rods (not shown) or as otherwise configured. Tubular body 632 may include a ~~male threaded~~ male-threaded pin connection 611 and ~~female threaded~~ female-threaded box connection 615.